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**THE CENTER FOR CONSERVATION BIOLOGY**

**COLLEGE OF WILLIAM AND MARY**

**VIRGINIA COMMONWEALTH UNIVERSITY**

# Investigation of Red-cockaded Woodpeckers within the Great Dismal Swamp National Wildlife Refuge: 2017 report

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**Front Cover:** First two woodpeckers produced within the refuge. Photo by Bryan Watts.

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# Table of Contents

## Contents


EXECUTIVE SUMMARY 1

BACKGROUND 2

Context 2

GOALS AND OBJECTIVES 3

METHODS 3

Site Description 3

Banding 4

Population Monitoring 5

Translocation 5

Cavity Tree Monitoring 6

RESULTS 6

Breeding Observations 6

Breeding Details 7

Population Monitoring 8

Translocation 8

Cavity Tree Status 9

ACKNOWLEDGMENTS 9

LITERATURE CITED 10

# EXECUTIVE SUMMARY

The Virginia population of red-cockaded woodpeckers is the northernmost throughout the species range and has been in eminent danger of extinction for more than 30 years. The single remaining population within the Piney Grove Preserve has responded to intensive management and is now approaching capacity but continues to be at risk to stochastic events such as hurricanes, tornadoes and disease. To offset this risk a three-phase conservation plan was developed that includes the establishment of additional breeding locations. The Great Dismal Swamp National Wildlife Refuge was identified as a high priority site for the establishment of a second population due to its capacity for habitat management and the similarity of habitat to non-typical red-cockaded woodpecker sites in nearby coastal North Carolina. In an effort to establish a population within the swamp, habitat management was initiated several years ago and translocation of birds into established recruitment clusters began in 2015.

During the 2017 breeding season, the first breeding attempts were recorded and the first young were produced within the Great Dismal Swamp, NWR. By May the site supported two potential breeding groups. Both of these groups produced three-egg clutches. Three of the six eggs hatched and two of the three young fledged successfully resulting in a reproductive rate of 1±1.0 (mean±SE) young/breeding group. Both birds were females and both were still present within the site in December of 2017.

During the calendar year of 2017, 17 individual red-cockaded woodpeckers were identified within the Great Dismal Swamp, NWR including three birds from the 2015 translocation cohort, two birds from the 2016 translocation cohort, ten birds from the 2017 translocation cohort and two birds produced within the refuge during the 2017 breeding season. Three birds were lost between the 2016 winter survey and the 2017 spring survey leaving only five birds moving into the breeding season. Two translocation events were executed during the fall of 2017 including a move of eight birds (4 females and 4 males) from Carolina Sandhills, NWR on 5 October and two birds (1 female and 1 male) from Piney Grove Preserve on 19 October. Eleven birds were detected during the 2017 winter survey. This compares to seven in 2015 and eight in 2016.

A total of 62 woodpecker cavities had been created within the Great Dismal Swamp, NWR by the end of 2017. Three of these cavity trees were lost in October of 2016 during Hurricane Matthew. An additional six cavity trees were lost in March of 2017 during high-wind events. All of the trees lost in 2017 were snapped off at the insert location including two that were being used as roost trees. To compensate for losses, nine artificial cavities were installed during the late summer of 2017. The first natural cavity was discovered in a pond pine in December of 2017 (cluster S2-2).

# BACKGROUND

## Context

The red-cockaded woodpecker (Picoides borealis) is endemic to the southeastern pine ecosystem, breeding from Texas and Oklahoma east to Florida and north to Virginia (Jackson 1994). Highly specialized, the species requires old growth, fire-maintained pine savannas. Throughout the twentieth century, advances in transportation, wood processing, and silvicultural practices shifted the emphasis from long-rotation lumber production to maximum-yield fiber production and resulted in catastrophic declines in habitat availability for this species. Breeding distribution contracted from the edges of the range and became localized within the core of the historic range where remnant old growth remained. The red-cockaded woodpecker was listed as endangered in 1970 and received protection with the passage of The Endangered Species Act in 1973 (16 U.S.C. 1531 et seq).

The historic status and distribution of the red-cockaded woodpecker in Virginia is poorly known because no systematic survey of the species was completed prior to dramatic habitat losses. Early accounts of red-cockaded woodpeckers were made from all physiographic provinces of Virginia. Jurisdictions with records include the counties of Giles (Bailey 1913), Albemarle (Rives 1890), Brunswick (Murray 1952), Dinwiddie (Murray 1952), Chesterfield (Murray 1952), Southampton (Steirly 1949), Sussex (Steirly 1950), Prince George (Steirly 1957), Greensville (Steirly 1957), Isle of Wight (Steirly 1957) and the current independent cities of Norfolk (Bailey 1913), Suffolk (Steirly 1957), Virginia Beach (Sykes 1960), and Chesapeake (van Eerden and Bradshaw, unpublished observation). The first systematic survey of the species was initiated in 1977 and resulted in the documentation of 43 clusters within 5 counties (Miller 1978). By 1980, only 9 of these clusters were still forested (Bradshaw 1990). During the 20-year period between 1980 and 2000, the decline of the Virginia population is well documented (Watts and Bradshaw 2005). By 1990, only 5 of the original 23 clusters detected in 1977 were still active. During the breeding season of 2002, Virginia supported only 2 breeding pairs and 2 clusters with solitary males.

The red-cockaded woodpecker was recommended for endangered status within the state of Virginia in 1978 (Byrd 1979) and 1989 (Beck 1991) and was listed as a Tier I Species of Greatest Conservation Need in the 2005 Virginia Wildlife Action Plan (VDGIF 2005). The stated rationale for recommendations was the extremely low and declining population in Virginia, continued loss and degradation of required old growth forests and the fact that all remaining breeding sites existed on private lands making appropriate management unfeasible. Following these recommendations, the Virginia Department of Game and Inland Fisheries and partners have mounted extensive monitoring and management efforts for the past 30 years. Acquisition of the Piney Grove Preserve in 1998 by The Nature Conservancy was a critical turning point in the species' recovery (Watts and Bradshaw 2005). Intensive habitat and population management on this last remaining site in Virginia has resulted in a population increase from 2 breeding groups in 2002 to 13 breeding groups in 2014 (Wilson et al. 2015).

The possibility of losing this single Virginia population due to stochastic events such as hurricanes, tornadoes, pests, and diseases over time is high. To offset this risk, a three-phase conservation plan was developed that includes the establishment of additional breeding locations (Watts and Harding 2007). Red-cockaded woodpeckers have been found in non-typical habitats within coastal North Carolina over the past

decade that includes pond pine pocosin woodlands. This habitat type is abundant within the Great Dismal Swamp National Wildlife Refuge and the site has been identified as a high priority for establishment of a second population. Habitat restoration was initiated within the site several years ago and translocation of birds into established recruitment clusters began in 2015.

# GOALS AND OBJECTIVES

The primary objective of this ongoing project is to establish a breeding population of Red-cockaded Woodpeckers within the Great Dismal Swamp, NWR. A secondary objective is to collect information relevant to the continued management of birds and their habitat in Virginia. Specific objectives include:

1) To determine the number and identification of all birds resident within the Great Dismal Swamp, NWR during the 2017 calendar year.
2) To monitor breeding activity in order to document productivity and allow for the unique banding of all individuals within the population.
3) To determine fledging success for all breeding attempts.
4) To translocate birds from donor sites to the Great Dismal Swamp, NWR.
5) To monitor cavity tree and artificial cavity condition.

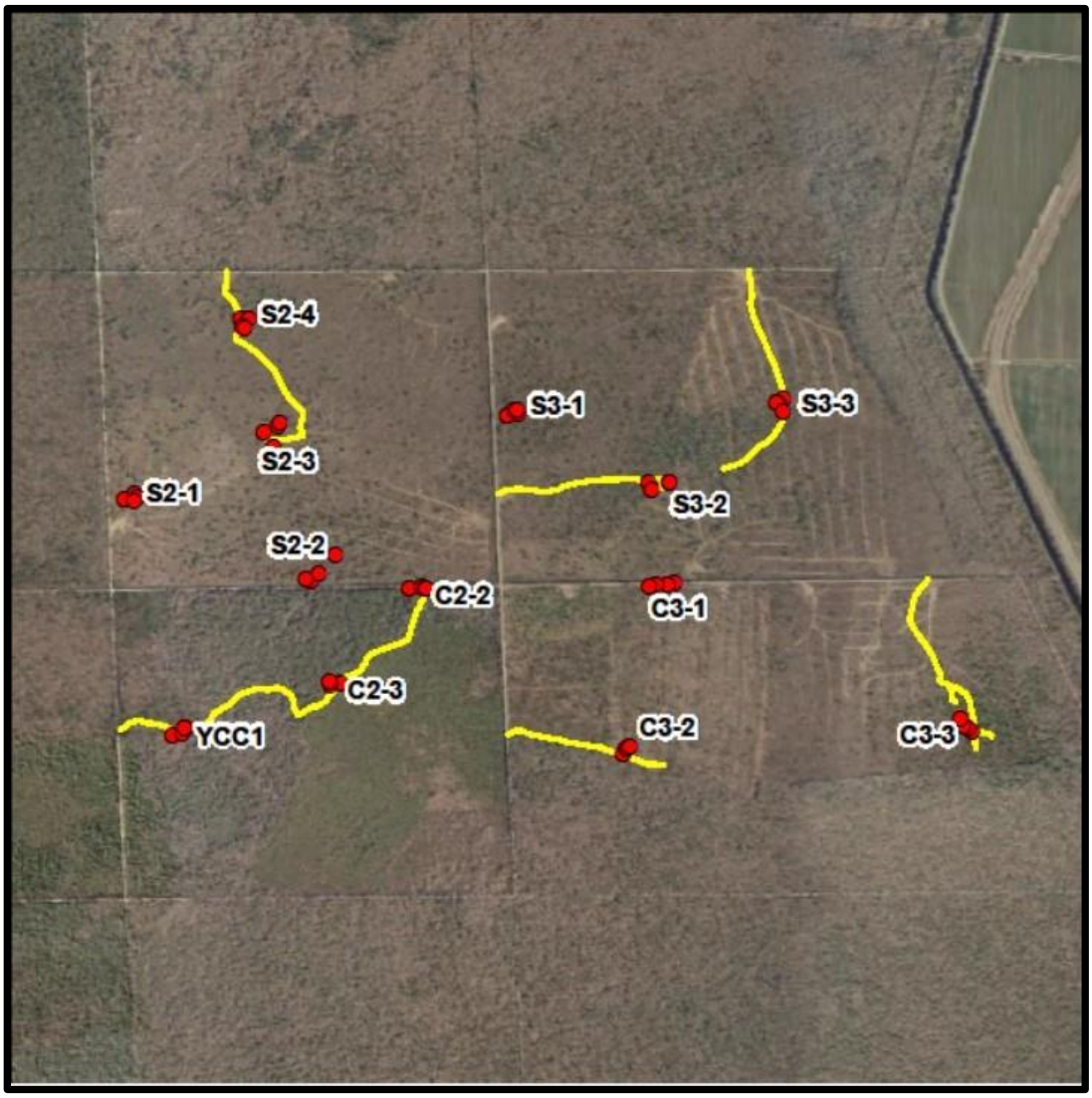
# METHODS

## Site Description

The Great Dismal Swamp is the northernmost of the great humid swamp forests within the southeastern United States and one of the largest remaining on the Coastal Plain. Considered to be centered on Lake Drummond in the Virginia cities of Suffolk and Chesapeake, the swamp extends into the North Carolina counties of Currituck, Camden, Perquimans, Gates, and Pasquotank. The swamp is positioned on a low, poorly drained, flat marine terrace that ranges from 4.5 to 7 m above sea level. Except for the western edge, which is defined by the Suffolk Scarp, the boundaries of the swamp are poorly defined. The Great Dismal Swamp, NWR (45,000+ ha) and the adjacent North Carolina Dismal Swamp State Park (6,000+ ha) are protected portions of the historic swamp that support a complex ecosystem (conservation lands do not extend into Currituck and Perquimans counties). The vegetational composition of the swamp has changed dramatically over the past 100 years and comparisons to historical descriptions suggest a strong succession toward mesic forest types and away from swamp-like conditions. Virtually no virgin timber remains on the site.

The section of the swamp that has been designated for the establishment of red-cockaded woodpeckers is referred to as “The Blocks.” Thirteen recruitment clusters have been developed within this study area to facilitate population establishment (Figure 1). Each cluster includes four pine trees with artificial cavities and an access trail connected to the road system.

**Figure 1.** Thirteen recruitment clusters within the Great Dismal Swamp, NWR developed within this study area to facilitate population establishment of translocated red-cockaded woodpeckers.




## Banding

Being able to identify individual birds is an essential element of the monitoring program. Banding individuals with unique combinations of color bands allows for their identification and, for this reason, has been one of the project goals.

Nestlings – For logistical and safety reasons, banding of red-cockaded woodpecker nestlings is restricted to an age window of 5-10 days. Because of this restriction, close monitoring of breeding activity is essential to successful banding. During the early portion of the breeding season, we monitored both the breeding pair and the nest cavity from each cluster area to determine clutch initiation dates. We used a miniature video camera mounted on a telescopic, extendable pole to monitor breeding status. The pole can accommodate

cavity heights to 50 ft (15.2 m). We estimated hatching dates from egg dates and closely monitored nest cavities around the time of expected hatching to verify hatch dates. We projected the banding window for nestlings from estimated hatching dates.

We banded all nestlings within the recommended age window. We climbed nest trees with Swedish climbing ladders and extracted nestlings from cavities using a noose apparatus. We lowered nestlings to the ground, aged, banded, weighed, and returned them to cavities. Each nestling received a unique combination of color bands. Nestlings were weighed at the time of banding using a Pesola spring scale. We determined the sex of nestlings either by examining crown plumage while in the cavity or during fledge checks. We confirmed fledging of all birds in the first two weeks after the projected fledge date.

## Population Monitoring

We conducted two systematic surveys of all birds within the Great Dismal Swamp, NWR to identify individuals and to determine distribution. We conducted surveys in the early spring prior to the expected breeding window and in early winter after the expected dispersal period. We visited all recruitment clusters before dusk to identify birds as they returned to roost trees for the night. We read combinations of color bands with spotting scopes and determined roost trees. We systematically worked through all sites over a period of days until all individuals were identified. Once clutches were laid, observations were made at the nest cavity to identify the breeding male and female for each site.

## Translocation

A large, integrated team of biologists roosted birds in September within donor sites (Carolina Sandhills, NWR, Piney Grove Preserve) to determine retention of hatching-year birds and to identify target birds. Target birds and backup birds were identified for possible translocation. Target and backup birds were roosted again during the first week of October in preparation for captures. Trapping teams were deployed to capture birds prior to roosting during the night of the translocation. Birds were captured after entering cavities using pole nets. Once captured, birds were lowered to the ground and handled to confirm identification and gender. Birds were placed in transport boxes and driven to the Great Dismal Swamp, NWR for placement.

Birds were placed in artificial cavities, screened in for the night and released at dawn the following morning. We climbed recipient trees using Swedish climbing ladders, placed birds in artificial cavities and tacked screens over the entrance. A release team returned to the recruitment cluster before dawn the following morning. Screens were removed just after dawn and birds were allowed to fly out into their new habitat.

## Cavity Tree Monitoring

All known cavity trees were visited to evaluate tree condition and cavity characteristics. Tree-condition categories used included live or dead, standing, broken (snapped off), fallen (down by roots), evidence of beetle or other insect damage, and evidence of lightning strike. Cavity characteristics recorded included origin (artificial insert or natural), height, entrance orientation, occurrence of resin wells, size and completeness of entrance plate, and the activity status. Activity status was determined by the presence or absence of chipping, fresh or recent sap flow, and dry sap. We used a peeper scope to examine cavities for the presence of competitors.

# RESULTS

## Breeding Observations

Great Dismal Swamp, NWR supported two potential breeding groups of red-cockaded woodpeckers in 2017 (Table 1). This compares to only one potential breeding group in 2016. Supporting clusters included S2-3 and S3-3. During the 2016 breeding season, only S2-3 supported a potential breeding group (no nesting attempt was documented). Breeding success was 50% with both breeding pairs producing a single clutch of three eggs (Table 2). Three of the six eggs hatched and two of the three young fledged successfully, resulting in a reproductive rate of 1±1.0 (mean±SE) young/breeding group. Both birds were females and both were still present within the site in December of 2017.

**Table 1.** Summary of 2017 breeding activity for red-cockaded woodpeckers within Great Dismal Swamp, NWR.

| Breeding Group | Potential Breeding Group? | Breeding Attempt? | Eggs Laid | Eggs Hatched | Banding Age | Fledged |
|---|---|---|---|---|---|---|
| Cluster S3-3 | Yes | Yes | 3 | 3 | 2 | 2 |
| Cluster S2-3 | Yes | Yes | 3 | 0 | ----- | ----- |
| Total | 2 | 2 | 6 | 3 | 2 | 2 |

**Table 2.** List of red-cockaded woodpecker nestlings banded within Great Dismal Swamp, NWR during the 2017 breeding season. Genders were determined during fledge checks.

| Breeding Group | Date | USGS Band | Left | Right | Sex |
|---|---|---|---|---|---|
| Cluster S3-3 | 5/20/2017 | 901-29849 | YE/DB/WH | PK/AL | F |
| Cluster S3-3 | 5/20/2017 | 901-29850 | YE/DB/PK | PK/AL | F |

## Breeding Details

Cluster S3-3 – This is the first year that this cluster has been occupied during the breeding season. Both the male (AL/PU: DG/RY/OR) and female (AL/PU: WH/YE/YE) were from the 2015 cohort that was translocated from Carolina Sandhills, NWR. The male was half of the potential breeding group located within S2-3 during the 2016 breeding season. This bird had moved to S3-3 by the winter 2016 survey. The female was roosting in C3-1 from the fall of 2015 until just before the 2017 breeding season. During the 2017 breeding season, the male was roosting in T101 and the female was roosting in T102. The nest cavity was T102. Three eggs were first discovered on 7 May and all three hatched on 13 May. Two birds were present within the cavity on 20 May when banding was conducted. Both birds present were banded and keyed out to be 7 days old. The birds weighed 23.0 g and 15.5 g, respectively. Both young were sexed as females and were observed out feeding in the cluster on 19 June. During the winter count, one young remained within the natal cluster and the other was roosting in cluster C3-3.

Cluster S2-3 – This is the second year that this cluster has been occupied during the breeding season. During the 2016 breeding season, the site was occupied by male (AL/PU: DG/RY/OR) and female (AL/PU: OR/DB/LG). Both of these birds were from the 2015 cohort that was translocated from Carolina Sandhills, NWR. No breeding attempt was documented despite consistent monitoring. This female disappeared from the site during the fall of 2016. The male had moved to S3-3 by the winter of 2016. The 2017 breeding female and male were from the 2015 and 2016 cohorts, respectively, and had been translocated from Carolina Sandhills, NWR. The breeding female (AL/PU: YR/LG/RY) was present throughout the northwest quadrant of the study area throughout 2016 and had settled in S2-3 by the winter 2016 survey. Following translocation, the breeding male was roosting in YCC1 and moved over to S2-3 just before the breeding season. During the 2017 breeding season, the male was roosting in T49 and the female was roosting in T48. The nest cavity was T48. An exchange was observed on 25 May suggesting incubation. Three eggs were confirmed in the cavity on 26 May. Three eggs were documented on 3 June but the nest was empty on 6 June. Both breeding adults were present and roosting in the cluster during the winter survey.

## Population Monitoring

During the calendar year of 2017, 17 individual red-cockaded woodpeckers were identified within the Great Dismal Swamp, NWR (Table 3). This includes three birds from the 2015 translocation cohort, two birds from the 2016 translocation cohort, ten birds from the 2017 translocation cohort, and two birds produced within the refuge during the 2017 breeding season. Three birds were lost between the 2016 winter survey and the 2017 spring survey. Among those lost was a female (OR/YE/OR: LG/AL) from the 2015 cohort that had been roosting in YCC1 since the translocation. The disappearance of this bird coincided with the appearance of a male (AL/YE: PU/YE/YR) from the 2016 cohort that took over the roost tree. This male would later leave the cluster and become the breeding male in cluster S2-3. A second male (AL/YE: OR/LB/OR) from the 2016 cohort also disappeared from YCC1. A female from the 2016 cohort was lost from C3-3 just prior to the spring count. This bird was roosting in T006 and when this tree was examined on 6 February there was a fresh feather in the resin around the cavity entrance and fresh resin well work on the tree but no bird entered the cluster area to roost. A pile of red-cockaded woodpecker feathers was found under this tree two days later that could have been the remains of this bird. This cluster is frequented by cooper's hawks throughout the winter months.

Only five birds were detected during the spring 2017 census, including three from the 2015 cohort and two from the 2016 cohort (Table 3). This included two males and three females. All of these birds became breeders except for one female (AL/YE: YE/YR/YE). This bird roosted in C2-3 over the winter until the roost tree was snapped off in a storm. The bird was later observed in S2-3 but disappeared just before the breeding season and has not been detected since. Despite these losses, the population sustained two potential breeding groups into the breeding season compared to only one during the 2016 breeding season.

Eleven birds were detected during the 2017 winter survey (Table 3). This compares to seven in 2015 and eight in 2016 (Table 3). Included were three birds from the 2015 translocation cohort, one bird from the 2016 cohort, five from the 2017 cohort, and two birds produced locally in 2017. There were four males included in the winter count, including both breeding males and two males from the 2017 cohort. One of these males was roosting in C3-3 with a female. The other was roosting alone in C3-1.

## Translocation

Two translocation events were executed during the fall of 2017, including a move of eight birds (4 females and 4 males) from Carolina Sandhills, NWR on 5 October and two birds (1 female and 1 male) from Piney Grove Preserve on 19 October (Table 4). Both of these events were scheduled following two rounds of intensive identification of target birds and location of roost trees. Birds were captured successfully following roost entry, placed in transport boxes, driven to Great Dismal Swamp, NWR, placed in artificial inserts, and screened in cavities for the remainder of the night. Birds were released the following morning by pulling screens and allowing the birds to fly out. All birds were translocated and released without incident. Birds were released into five clusters including YCC1, C3-1, S2-1, S3-1, and C2-2.

### Cavity Tree Status

A total of 62 woodpecker cavities were created within the study area on the Great Dismal Swamp, NWR by the end of 2017 (Table 5). This included 32 artificial cavities that were installed in 2015 and 20 that were installed in 2016. Three of these cavity trees were lost in October of 2016 during Hurricane Matthew. An additional six cavity trees were lost in March of 2017 during high-wind events. All of the trees lost in 2017 were snapped off at the insert location, including two that were being used as roost trees. To compensate for losses, nine artificial cavities were installed during the late summer of 2017. The first natural cavity was discovered in a pond pine in December of 2017 (cluster S2-2).

The majority of cavities continued to be in good condition during 2017 (Table 5). Only three of the cavities had any indication of water leaks and only four had an indication of cavity competitors. This general pattern is consistent with what was documented in 2016. The single largest cavity problem to date has been the construction of mud dauber nesting tubes. Nine of the artificial cavities had dauber tubes during the last assessment. Again, this problem is consistent with observations in 2016. Although this problem has been documented in other populations, the frequency is high and appears to be somewhat specific to the swamp ecosystem. The nesting tubes are constructed in mid to late summer after the breeding season, suggesting that a late summer to early fall management period may effectively reduce potential impacts to birds.

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